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ABSTRACT

A study used a diffusion of innovation approach to examine the adoption of digital imaging technology at daily college newspapers and to gauge its effect on student journalists' attitudes about the credibility of news photography and their work routines. College papers are well suited for such a study because their adoption of technology is likely to be more gradual than at professional papers. The study measures adoption rates over a 3-year period using questionnaires sent to student newspapers publishing at least 4 days per week. Measurement began in the early adoption stage (13%) and concluded in the late majority stage (66%). In all, 99 newspapers participated. By April 1995, 56 of them were using digital imaging technology on a routine basis. Adoption rates followed an s-curved (sigmoid) pattern. Students at the papers using digital technology said they had an easier time processing their photographic reports. Most disturbing for the photojournalism profession, however, is the pessimistic attitude these student editors expressed about the future credibility of news photos. It is possible that those who work with the computers daily learn very well how easy it is to change photographic representation without leaving a trace. Students also reported that the technology allowed for significant improvements in the way they perform their jobs in the newsroom. Response patterns suggest early adopters and majority adopters reacted differently to digital imaging. (Contains 3 figures, one table of data, and 24 notes.) (TB)

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James D. Kelly

Going Digital at College Newspapers: The Impact on Photo Credibility and Work Routines

ED 401 533

Since the turn of the century, a long list of new communication technologies have irreversibly changed the way Americans get their news. Radio, television, and now computer technologies have each dramatically influenced the way news information is delivered, and their widespread adoption has changed the way journalists work and the way audiences interpret the news. But few technologies have challenged the fundamental veracity of news reports as directly as has the adoption of computer-based photographic processing by news organizations.

On several occasions during the last decade, the journalism profession has been shaken by discoveries that prominent publications have "altered reality" by digitally retouching news photographs.[1] Discussions and seminars have been held and guidelines and protocols have been issued in the wake of these transgressions, but the full impact of digital imaging technology on photography and on audience interpretation of photographic news reports is still in a state of flux. Some have suggested that the technology represents the "end of photography as evidence of anything."[2]

This study uses a diffusion of innovation approach to examine the adoption of digital imaging technology at daily college student newspapers and to gauge its effect on student journalists' attitudes about the credibility of news photography and their work routines. College papers are well suited for such a study because their adoption of the technology is likely to be more gradual than was the case at professional papers. Also, their journalists are less integrated into the professional culture of the newsroom

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professional development and their understanding of journalism's role in society.

There have been thousands of research reports using the diffusion of innovations approach applied to all manner of innovation.[8] The fundamental temporal pattern associated with the diffusion process approximates an S-shaped (sigmoid) curve when the cumulative level of adoption over time is graphed. The principal effect associated with this curve is the diffusion effect—that as the rate of awareness of an innovation among a population increases, peer pressure begins to develop and the rate of adoption accelerates. This peer pressure is particularly important in social systems that are highly connected.[9]

Rogers also postulates an adoption and innovation life-cycle curve that suggests people or organizations that adopt an innovation at similar times tend to have other similar characteristics. For organizations, key considerations are the extent to which the organization is open to change (risk taking) and the degree to which it perceives itself as an opinion leader (social participation). His life-cycle categories are innovators (first 2.5% of the population), early adopters (next 13.5%), early majority (34%), late majority (34%), and laggards (16%). These are based on a normally distributed population.[10]

Rogers and Shoemaker developed a model describing the stages through which an individual passes from first knowledge of an innovation to a decision to adopt or reject it. Awareness of the innovation is followed by interest, a period of evaluation, a trial use of the innovation, and eventually, adoption. This model is particularly useful in describing the sources and channels of information used by the individual in the adoption decision and the attitudinal changes associated with adoption.[11]

and more likely to exhibit attitudes contrary to the prevailing professional norm.

The adoption of digital imaging technology at professional daily newspapers is essentially complete. It occurred quite rapidly, largely as the result of the wire service decisions.[3] In March 1990, both the Associated Press and United Press International announced that all photo members and subscribers would soon be equipped with a digital imaging computer and that within two years all photo transmissions from either wire service would be digital.[4] The effect of the announcement was to force the transition to the new technology much more rapidly than most had anticipated. By June 1992 all photo subscribers to these two major wire services had electronic darkrooms.[5] This "forced" adoption made a diffusion of innovation study quite problematic.

Few college newspapers subscribe to a photographic wire service, however. Therefore, they have not experienced this forced adoption to the same extent. The adoption process will likely occur over a longer time period and be more amenable to systematic study.[6] Student newspapers are especially appropriate subjects for this study because of the nature of their staffs. College papers inform their communities in much the same way their general circulation counterparts do. But their staffs are only beginning their initiation into the newsroom routines and practices that form a basis for journalists' understanding of the audience and the news.[7] Attitudes about news and journalism are still being formed by staffers and the effects of technology adoption on their perceptions of news credibility are more likely manifest than may be the case for seasoned professionals. Regardless of whether students are more susceptible to adoption effects, the attitudes and ideas they develop while in college will contribute to their

Research on technology adoption in journalism has focused primarily on the adoption of computers for text editing.[12] Slater, et al. found that students using VDTs made fewer mechanistic changes and more structural ones than students using paper and pencil, suggesting that the change in technology affected how editors shaped the content of the news.[13]

Much of the research on college student newspapers has been on the role of the papers' advisors rather than on the nature of the educational experience newspapers provide,[14] although studies have investigated aspects of college newspapers such as staff compensation,[15] and the legal implications of court decisions regarding free press issues.[16] Still, none have specifically examined the adoption of a new technology over time for either educational or business related reasons. This is somewhat surprising since more than half of college journalism programs report that work for a college newspaper is part of the curriculum requirements.[17]

In 1982 the Gannett Foundation did fund an extensive survey of daily college newspapers by Paul Atkins.[18] Although more broadly focused than this study, Atkins examined technological issues, but his report was exclusively descriptive rather than analytic. He found that the majority of daily newspapers were using video display terminals and photo typesetters and many reported transition problems. Atkins also reported that somewhat less than one-half of the papers had "moderately good" to "excellent" photographic facilities but suggested that many suffered from inadequate labs and photo equipment.

In a 1987 article, John Ahlhauser forecast several changes likely to happen as newspapers adopted digital imaging technologies. They included 1) increased time shooting, 2) greater contact with reporters and editors, 3) increased ease of handling, 4) extended deadlines, and 5) the potential for a

lose of control of image selection and marginalization of the photographer.[19] He suggested that changes in work routine would depend on the preparation and professionalism of photojournalists.

Purpose of the Study

The study's purpose is to measure the adoption rate of digital imaging technology during the three-year period immediately following the adoption of such technology at all Associated Press member newspapers. It assesses the degree to which student photo editors perceive the new technology as a threat to newsphoto credibility and attempts to describe the relationship between technology adoption and credibility attitudes. Finally, the study examines editors' assessments of how the technology adoption affects the work routines photojournalist follow as they collect and edit the visual news.

The study advances the following assumption and research questions:

> A1: Once digital imaging technology has been adopted for routine use in a daily college student newspaper, the technology will not be abandoned within three years of use.
>
> RQ1: At what rate are daily college student newspapers adopting digital imaging technologies for the routine processing of news photographs?
>
> RQ2: How do student editors evaluate the effect of digital imaging technology on the credibility of news photography?
>
> RQ3: What is the nature of the relationship (if any) between the adoption of digital imaging technologies and student photo editors' perceived effect of the technology on newsphoto credibility?

RQ4: How do student editors evaluate the effect of digital imaging technology on the work routines of newspaper photographers?

This study reports six time points in a survey investigation of digital imaging technology at college newspapers.[20]

Method

The method was mail survey. The design was repeated cross-sectional census with accumulation. A four-page questionnaire was sent to all college newspapers in the *Editor & Publisher International Yearbook* listing four or more publication days per week in the following months: October 1992, April 1993, October 1993, April 1994, October 1994, and April 1995.[21] Questionnaires at each wave were largely identical and all responses reported here were to identical questions asked at each of the six surveys. The cover letter for each survey was addressed to the newspaper's photo editor or chief photographer or "the photographer with the most authority over the photo staff." Sixty-eight editors responded to the first survey, sixty to the second, fifty-eight to the third, seventy to the fourth, sixty-six to the fifth, and fifty-six to the sixth. The average newspaer returned almost four (3.93) of the six surveys sent.

In reporting results at each time period, the response from the most recently completed survey is used. For example, if no questionnaire was returned for the second period, responses from the first questionnaire are reported for the second time period as well as the first. Likewise, if a single question in the third questionnaire is missing, the response to that question from the previous period is used in reporting on the third period. This method conservatively measures adoption at each time point since a

non-responding paper may be reported as a non-adopter even though it in fact had adopted the technology. The underlying assumption is that once the digital imaging technology is adopted it is not discontinued within the year time period serving as the cross section. Providing that this assumption is met, the effective response rate to the sixth questionnaire is 95.2%.

In the introduction to the questionnaire, digital imaging was defined as "the conversion of an image into a computer readable data file and the manipulations done on such a file prior to printing on paper." The questionnaire addressed three principal areas: 1) the paper's current use of digital imaging technology, and 2) the individual respondent's attitudes toward digital imaging and newsphoto credibility, and 3) her or his perception of changes in work routines since adoption.

In each survey, all respondents were asked if their paper had ever published a digital image and whether the majority of their photos were processed digitally. Those who responded affirmatively to both were asked when they began routine use of digital imaging technology. All respondents where asked whether the adoption of the technology at newspapers would increase, decrease, or not influence the credibility of news photos in the future. Respondents at newspapers using the technology routinely were also asked to rate the effect adoption had had on work routine by responding either "much worse," "worse," "the same," better," or "much better," to the statement: "Compared to the chemically based creation of photographic prints and halftones, please rate the following aspects of digital imaging: 1) photo staff's control of content, 2) ease of picture handling, 3) speed of picture handling, 4) morale of photo staff, 5)

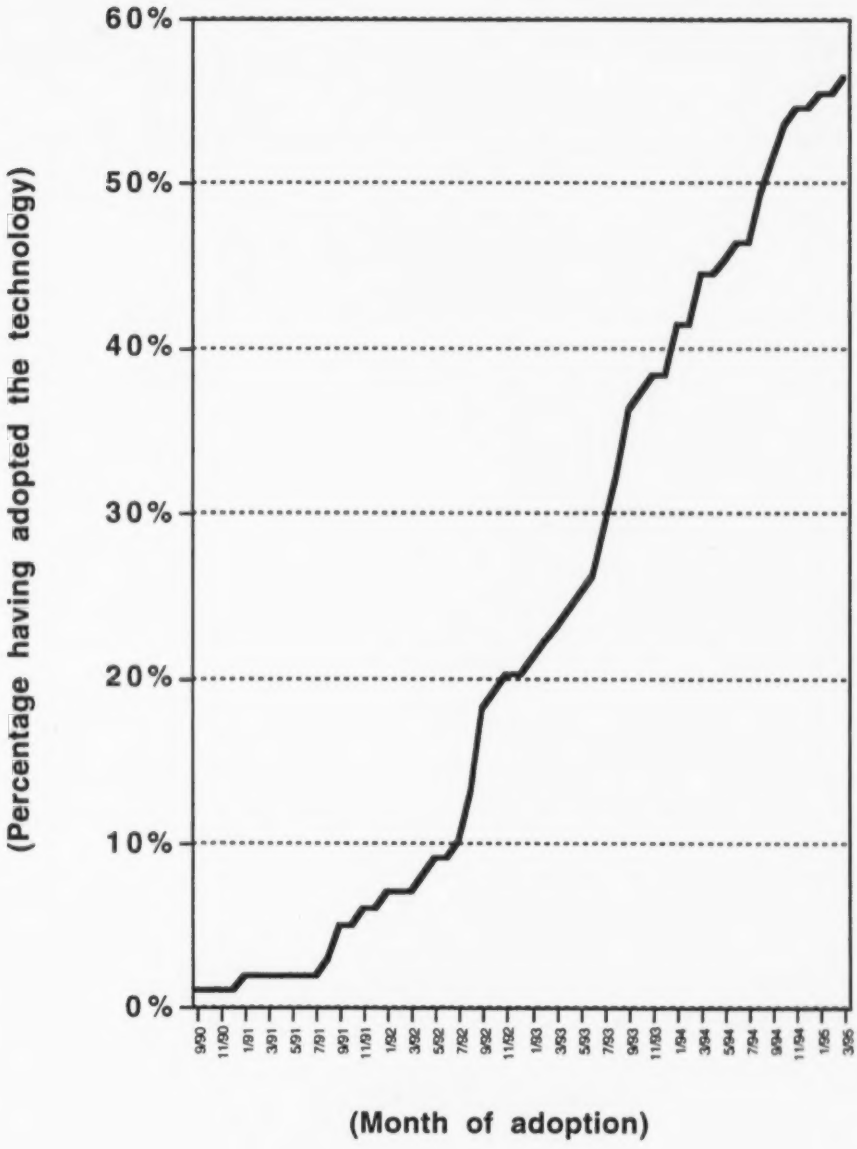
relationship between photo staff and rest of newsroom staff, and 6) amount of time available for photographic assignments.

Findings

By April 1995, 56 daily student newspapers were using digital imaging technology on a routine basis for processing the majority of their photographs and 77 had published at least one photo using the technology as a trial and all 99 respondents indicated they were aware of the technology at newspapers. The 56 "adopters" represent 57% of the 99 respondents and 53.8% of all 104 dailies.[22] Only nine reported using the technology routinely prior to June 1992, the month when the AP announced all of its members were digitally equipped. Using Roger's terminology, this study has measured respondents in the early adopter, early majority, and late majority adoption stages.[23]

Those reporting the routine use of digital imaging in the first and second surveys were "early adopters." Those responding in the following surveys were "early majority" save for a few who would, strictly speaking be in the "late majority" stage since they adopted the technology after a 50 percent saturation rate had been established. The actual adoption rate, when plotted cumulatively on a monthly basis, roughly approximates the first half of the S-shaped adoption curve predicted by Rogers with slight variation occurring each year in the early fall—traditionally the beginning of the college school year. See Figure 1.

Figure 1. Adoption rate of digital imaging technology.



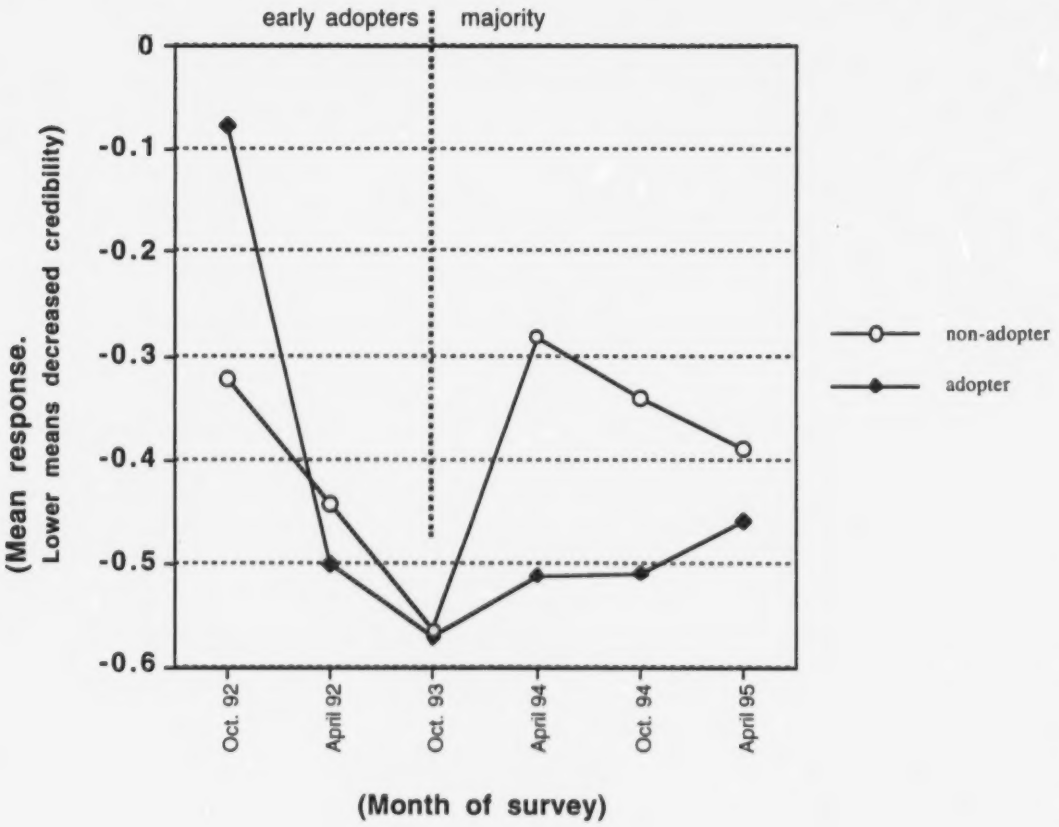
Examination of the responses to each of the six questionnaires indicated that no newspaper discontinued use of digital imaging once they had adopted it. This finding supports the non-abandonment assumption made above.

Newsphoto Credibility. The student editors were generally quite pessimistic about the future of newsphoto credibility in the digital era. When asked in the final questionnaire whether the use of digital imaging technology by newspapers would increase, decrease, or not change the credibility of newsphotos, 52.5% said it would decrease credibility. Only 34.9% expressed this view in the first survey two and a half years earlier. Indeed, the average response (scoring decrease as -1, no change as 0, and increase as 1) at each of the six waves was negative.

Additionally, the pattern of responses over time suggests a difference between both adopters and non-adopters, and between the early adoption stage and the early majority stage. In October 1992, adopters were considerably more optimistic about the future of newsphoto credibility than non-adopters. But by the second wave six weeks later, they were less optimistic and they remained so through the most recent survey. Both adopters and non-adopters showed lower averages in the second and third wave than the first, and both improved in waves four, five, and six. But in these later waves, adopters' scores were considerably lower than non-adopters. When both groups' mean responses are plotted over time, similar patterns emerge save for the extreme divergence at the initial time point and immediately after October 1993—the point marking the break between early adopters and early majority. See Figure 2

Figure 2. All respondents' evaluations of digital imaging's impact on the credibility of news photos.

range = -1 "decrease credibility" to 0 "not change credibility"



Work Routine. Although adopters expressed concern about the credibility consequences of the new technology, they were generally quite pleased with the effect adoption had had on work routines. With the single exception of the earliest adopters' concern about control of content, the average editor at a digital paper said the technology had made the work of the staff better or much better. See Table 1.

Table 1. Respondents' evaluation of the impact of the adoption of digital imaging on work routines.

range = 1 "much worse" to 5 "much better" than before digital imaging (standard deviation)

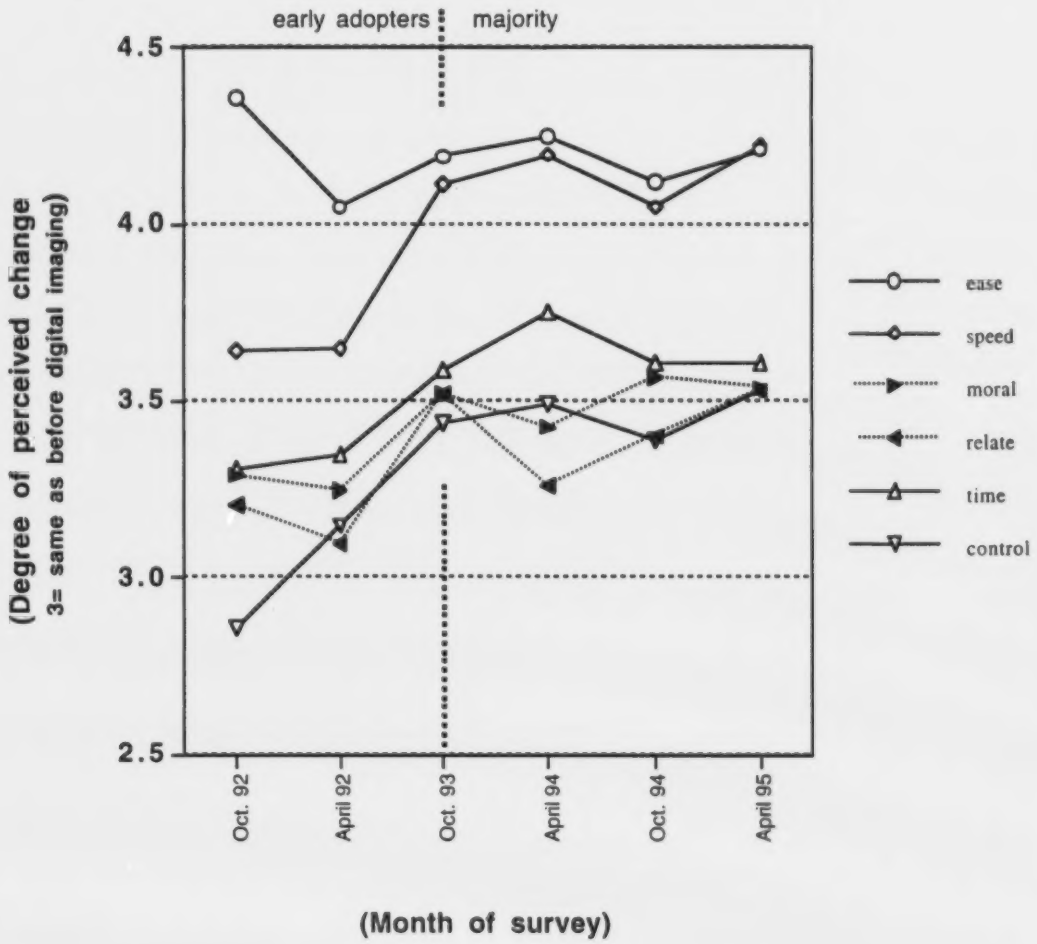
	Oct. '92 N=14	Apr. '93 N=20	Oct. '93 N=27	Apr. '94 N=45	Oct. '94 N=57	Apr. '95 N=62
Photo staff's control of content	2.86 (.86)	3.15 (1.23)	3.44 (1.19)	3.49 (1.24)	3.39 (1.06)	3.53 (.97)
Ease of picture handling	4.36 (.63)	4.05 (1.00)	4.19 (.89)	4.25 (.84)	4.12 (.89)	4.21 (.81)
Speed of picture handling	3.64 (.93)	3.65 (1.09)	4.11 (.85)	4.20 (.89)	4.05 (.95)	4.22 (.82)
Morale of photo staff	3.29 (.91)	3.25 (1.02)	3.52 (1.01)	3.43 (1.09)	3.57 (1.10)	3.54 (.99)
Relationship between photo staff and rest of newsroom	3.21 (1.05)	3.10 (.79)	3.52 (.70)	3.26 (.99)	3.40 (.90)	3.53 (.74)
Time available for photographic assignments	3.31 (.75)	3.35 (.87)	3.59 (.88)	3.75 (.81)	3.61 (.82)	3.61 (.75)
Grand Means	3.44	3.42	3.73	3.73	3.69	3.77

Two work routine considerations were particularly positive and plots of each reveal a pattern similar to the one found for newsphoto credibility. Both the ease and the speed with which photos could be processed digitally were considered better than with chemical prints throughout the time measured and they were considered *much* better once the majority stage had begun. Indeed, across all six aspects of work routine measured there is a noticeable difference between the evaluations by the early adopters and the majority adopters. Editors at each time point view adoption as beneficial, but the majority appear to have less difficulty maintaining image

control, deriving efficiency gains and translating those gains into increased time shooting assignments outside the newsroom. See Figure 3.

Figure 3. Respondents' evaluation of the impact of the adoption of digital imaging on work routines.

range = 1 "much worse" to 5 "much better" than before digital imaging



Discussion

As predicted by the diffusion of innovation research reviewed earlier, adoption of digital imaging technology at the country's daily college student newspapers is following a s-curved (sigmoid) pattern and about one half are

now using the technology for routine processing of news photographs. The primary anomaly seen in the cumulative percentage diffusion curve is a cyclical pattern where adoption decisions are clustered around the autumn of each year—traditionally the beginning of the school year and fiscal budget.

Ahlhauser's predictions about changes in the work routine brought on by the adoption of digital imaging have also been borne out. Students at the papers routinely using the technology said they had an easier time processing their photographic reports and that they had established better relationships with the rest of the newsroom. And the transition from chemical to electronic technology actually increased the photo staffs' control over their images.

Most disturbing for the photojournalism profession, however, is the pessimistic attitude these student editors repeatedly expressed about the future credibility of newsphotos. Certainly the potential for abuse using the technology was widely known prior to even the earliest college newspaper adoption. The *National Geographic* had stirred up considerable controversy in journalistic circles when it used an early version of today's technology to move two Egyptian pyramids closer together on a 1982 cover.[24] Since then, the National Press Photographers Association, the Associated Press, and numerous other news organizations have issued guidelines and protocols in an attempt to safeguard the credibility of photographic images published in the press.

The students' concern about credibility is unlikely due entirely to the introduction of the technology in their own work environment—discussion of digital imaging has enlivened the profession for years and students are surely aware of its ramifications. Simply using the technology does not lead one to predict decreased credibility—all six waves showed considerable

pessimism. But attitudes did appear to be moderated by the time at which adoption did occur. The earliest adopters saw very little change resulting from the technology—considerably less than those who had yet to get it in their newsrooms. But as time passed, more and more respondents said there would be a decrease. When the early majority stage was reached, fewer non-adopters forecast a decrease, but the adopters continued to be far more pessimistic than their colleagues without digital darkrooms.

It is possible that those who work with the computers daily learn very well how easy it is to change photographic representation without leaving a trace. Such a realization may foster a level of pessimism that those who only read or use the technology less regularly in non-newsroom situations do not generate.

On the other hand, these adopters attribute significant improvements in their ability to practice their profession as a result of the use of the technology. And in the case of work routine, those adopting in the majority are more likely to see improvement than were those who adopted earlier. This is possibly do to an increase in the understanding of how to use the technology generally within the profession as well as to an improvement in the equipment itself. Early adopters were blazing a trail. They had fewer people "in the know" to consult about how to best use the technology. Majority adopters also used computer equipment that was considerably faster and better able to handle the processing demands of photography.

This study clearly indicates that most daily college newspapers now use digital imaging technology routinely, just as their commercial colleagues do. They seem comfortable using the technology and pleased that it frees them up for more shooting and consulting with their newsroom colleagues. But they're concerned about what the technology will do to their chosen

profession. This concern is most likely a good thing, however. Credibility is at the heart of journalism. That students are concerned may make them extra vigilant in safeguarding the integrity of their images and insure that what they fear is never realized.

NOTES

1 "Newspapers' credibility losing focus?" *Chicago Tribune*, 20 Feb. 1994, sec. 1, p. 6, col. 4. See also Stacie D. Kramer, "Technology Can Make Photographs Lie," *St. Louis Journalism Review* 23 (June 1994): 3 and "...And Nothing But the Truth," *The Economist*, 19 March 1994, 34 for recent critical reviews.

2 Stewart Brand, Kevin Kelly and Jay Kinney, "Digital Retouching: The End of Photography as Evidence of Anything," *Whole Earth Review*, July 1985, 42-49.

3. Michael L. Morse, "At the Crossroads," *News Photographer*, May 1992, 12.

4 "AP, UPI to Replace Newspapers' Photo Receivers with Electronic Darkroom Systems," *Presstime,* March 1990, 63.

5 See "AP Drops an Electronic Bombshell," *News Inc.,* March 1990): 7; and "All Electronic Photo-Handling Systems Are Not the Same, Users Say," *Presstime*, July 1991, 37.

6 A recent article suggests digital imaging is being adopted at some college student newspapers. See Tom Hubbard, "Good News/Bad News in Teaching Field," *News Photographer*, March 1992, 25, 30-31.

7 See Gaye Tuchman, *Making News: A Study in the Construction of Reality*, (NY: Free Press, 1978), for a discussion of newsroom acculturation.

8 Rogers reported 2,297 in his 1983 edition of *Diffusion of Innovations*, and a meta-analysis he and associates published in 1987 examined eleven studies on home computers alone. See Everett M. Rogers, *Diffusion of Innovations*, 3d ed,(NY: Free Press, 1983); and William H. Dutton, Everett M. Rogers and Suk-Ho Jun, "Diffusion and Social Impacts of Personal Computers," *Communication Research* 14 (April 1987): 219-50.

9 Everett M. Rogers, *Diffusion of Innovations*, 76-81.

10 Everett M. Rogers, *Diffusion of Innovations*, 162.

11 Everett M. Rogers and F. Floyd Shoemaker, *Communication of Innovations: A Cross Cultural Approach,* (NY: Free Press, 1971), 52-70.

12 For examples see William R. Lindley, "From Hot Type to Video Screens: Editors Evaluate New Technology," *Journalism Quarterly* 65 (Summer 1988): 485-89; Linda J. Shipley and James K. Gentry, "How Electronic Editing Equipment Affects Editing Performance," *Journalism Quarterly* 58 (Autumn 1981): 371-74; Starr D. Randall, "Effect of Electronic Editing on Error Rate of Newspaper, *Journalism Quarterly* 56 (Spring 1979): 161-65; James A Crook, "How the New Technology Affects Student Editing," *Journalism Educator* 31 (January 1977): 12-15, 46

13 Michael D. Slater, Donna Rouner, and Martha Tharp, "Impact of VDTs on structural and mechanical editing," *Journalism Educator* 45 (Winter 1991): 45-48.

14 For example, Lillian Lodge Kopenhaver and Ronald E. Spielberger, "Advisors post some gains, fewer losses," *College Media Review* 30 (Summer/Fall 1991): 19-23;

Michael Ryan and David L. Martinson, "Attitudes of College Newspaper Advisers Toward Censorship of the Student Press," *Journalism Quarterly* 63, (1986): 55-60.

15 For example, Lillian Lodge Kopenhaver and Ronald E. Spielberger, "Surveying student newspaper compensation," *College Media Review* 32 (Winter/Spring 1993): 27-32.

16 Ruth Walden, "Editorial rights, constitutional restraints of editors of state-supported newspapers," *Journalism Quarterly* 62 (Autumn 1985): 616-25; Bruce Dudley, "Control of Small College Student Newspapers," *Journalism Quarterly* 48 (Fall 1971): 21-22.

17 This figure reported in Gerald M. Kosicki and Lee Becker, "Annual Census and Analysis of Enrollment and Graduation," *Journalism Educator* 47 (Autumn 1992): 67.

18 Paul A. Atkins, *The College Newspaper in the United States*, (Parsons, WV: McClain, 1982). See also Julius Duscha and Thomas Fisher, *The Campus Press: Freedom and Responsibility*, (Washington, DC: American Association of State Colleges and Universities, 1973), for a brief history of the campus press and a series of case studies of college newspapers' organizational structures.

19 John Ahlhauser, "How Visual Electronics Will Change the Newsroom," in Michael Morse, ed., *The Electronic Revolution in News Photography: A NPPA National Report*, (Durham, NC: National Press Photographers Association), 26-30.

20 Funding for the surveys is supported by a grant from the National Press Photographers Foundation to the author.

21 This definition of daily college newspaper was used by Atkins, *The Daily College Newspaper*, 5.

22 Because this study is a census of all 104 daily college newspapers, statistical tests of differences are not necessary. All observed differences are real. The sample comprises every element of the population and therefore contains no sampling error. See Roger D. Wimmer and Joseph R. Dominick, Mass Media Research: An Introduction, (Wadsworth: Belmont, CA, 1983), 56-57.

23 See Rogers, *Diffusion of Innovations*,

24 See Bennett Daviss, "Picture Perfect," *Discover*, July 1990, 54-58, and Jonathan Alter, "When Photographs Lie," *Newsweek*, July 1990, 44-45, for this and numerous other examples of digital retouching in editorial photographs.